EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3080	438/122,124,127.ccls.	US-PGPUB; USPAT	OR	ON	2007/09/12 09:59
L2	2169	1 and @ad<"20030918"	US-PGPUB; USPAT	OR	ON	2007/09/12 10:03
L3	1290	2 and resin	US-PGPUB; USPAT	OR	ON	2007/09/12 09:59
L4	2572	257/706,707,720.ccls.	US-PGPUB; USPAT	OR	ON	2007/09/12 10:00
L5	1940	4 and @ad<"20030918"	US-PGPUB; USPAT	OR	ON	2007/09/12 10:02
L6	7659	(MOSFET or transistor) same (resin or encapsulat$4)	US-PGPUB; USPAT	OR	ON	2007/09/12 10:03
L7	5080	6 and @ad<"20030918"	US-PGPUB; USPAT	OR	ON	2007/09/12 10:03
L8	2287	7 and source and drain	US-PGPUB; USPAT	OR	ON	2007/09/12 10:04
L9	1970	8 and (conduct$3)	US-PGPUB; USPAT	OR	ON	2007/09/12 10:05
L10	1585	9 and (step or stepwise or staircase)	US-PGPUB; USPAT	OR	ON	2007/09/12 10:22
L11	8	(conduct$3 and semiconductor and resin and recess and (step or stepwise or staircase) and source and gate).clm.	US-PGPUB; USPAT	OR	ON	2007/09/12 10:25
L12	9	(conduct$3 and (MOSFET or transistor) and resin and recess and (step or stepwise or staircase) and source and gate).clm.	US-PGPUB; USPAT	OR	ON	2007/09/12 10:25

DOCUMENT-IDENTIFIER: US 20040001174 A1

TITLE: Substrate for liquid crystal display, liquid crystal display having the same, and method of manufacturing the same

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Claims Text - CLTX (2):

1. A substrate for a liquid crystal display, comprising: pixel regions arranged in the form of a matrix on a base substrate; a plurality of first bus lines formed on the base substrate in parallel with each other; a first insulation film formed on the first bus lines; a plurality of second bus lines formed in parallel with each other such that they intersect the first bus lines with the first insulation film interposed therebetween; a thin film **transistor** formed in each of the pixel regions; a second insulation film formed on the thin film **transistor**; a wrinkled **resin** layer on the second insulation film, the wrinkled **resin** layer being formed with wrinkles on a surface thereof and having an insulating property; a reflective electrode formed of a light-reflecting material at each of the pixel regions on the wrinkled **resin** layer, a surface of the reflective electrode being formed with wrinkles that follow the surface of the wrinkled **resin** layer; a plurality of bus line terminals connected to each of the first and second bus lines; and a plurality of protective **conductive** films that are formed on the plurality of bus line terminals respectively from the same material as that of the reflective electrode and that are connected to the plurality of bus line terminals respectively.

Claims Text - CLTX (3):

2. A substrate for a liquid crystal display according to claim 1, wherein the plurality of bus line terminals have a peripheral section on which the wrinkled **resin** layer is formed.

Claims Text - CLTX (4):

3. A substrate for a liquid crystal display according to claim 1, wherein the wrinkled **resin** layer is formed of a resist.

Claims Text - CLTX (5):

4. A substrate for a liquid crystal display according to claim 1, wherein the wrinkled **resin** layer comprises a single layer.

Claims Text - CLTX (7):
6. A substrate for a liquid crystal display according to claim 1, wherein a surface of a region of a **source** electrode of the thin film **transistor** connected to the reflective electrode is removed through etching.

Claims Text - CLTX (8):
7. A substrate for a liquid crystal display according to claim 1, wherein a surface of a region of the bus line terminals connected to the protective **conductive** film is removed through etching.

Claims Text - CLTX (10):
9. A method of manufacturing a substrate for a liquid crystal display comprising the **steps** of: forming a first bus line and a first bus line terminal connected to the first bus line on a base substrate; forming a first insulation film on the first bus line and the first bus line terminal; forming a second bus line and a second bus line terminal connected to the second bus line on the first insulation film and forming a thin film **transistor having a gate** electrode connected to either of the first and second bus lines and a drain electrode connected to the other; forming a second insulation film on the second bus line and the second bus line terminal; forming a **resin** layer having openings above a **source** electrode of the thin film **transistor** and above the first and second bus line terminals by applying a **resin** on to the second insulation film and patterning the same; forming a wrinkled **resin** layer having a wrinkled surface by performing a predetermined process on the **resin** layer; etching the first and second insulation films by using the wrinkled **resin** layer as an etching mask; forming a film of a light-reflecting material on the wrinkled **resin** layer and patterning the same; and forming a reflective electrode connected to the **source** electrode having a wrinkled surface that follows the surface of the wrinkled **resin** layer, and forming a protective **conductive** film on the first and second bus line terminals.

Claims Text - CLTX (12):
11. A method of manufacturing a substrate for a liquid crystal display according to claim 9, wherein: the **resin** layer is a photosensitive **resin** layer; and the predetermined process is to bake the photosensitive **resin** layer at a predetermined baking temperature after irradiating a surface of the photosensitive **resin** layer with ultraviolet light.

Claims Text - CLTX (13):
12. A method of manufacturing a substrate for a liquid crystal display, comprising the **steps** of: forming a first bus line and a first bus line terminal

connected to the first bus line on a base substrate; forming a first insulation film on the first bus line and the first bus line terminal; forming a second bus line and a second bus line terminal connected to the second bus line on the first insulation film and forming a thin film **transistor having a gate** electrode connected to either of the first and second bus lines and a drain electrode connected to the other; forming a second insulation film on the second bus line and the second bus line terminal; forming a first **resin** layer having openings above a **source** electrode of the thin film **transistor** and above the first and second bus line terminals by applying a **resin** on to the second insulation film and patterning the same; etching the first and second insulation films by using the first **resin** layer as an etching mask; forming a second **resin** layer having openings above the **source** electrode of the thin film **transistor** and above the first and second bus line terminals by applying a **resin** on to the second insulation film and patterning the same; forming a wrinkled **resin** layer having a wrinkled surface by performing a predetermined process on the second **resin** layer; removing a sublimate and/or a thermal oxidation film formed on the **source** electrode and the first and second bus line terminals by performing etching using the wrinkled **resin** layer as an etching mask when the wrinkled **resin** layer is formed; forming a film of a light-reflecting material on to the wrinkled **resin** layer and patterning the same; and forming a reflective electrode connected to the **source** electrode having a wrinkled surface that follows the surface of the wrinkled **resin** layer, and forming a protective **conductive** film on the first and second bus line terminals.

Claims Text - CLTX (15):

14. A method of manufacturing a substrate for a liquid crystal display according to claim 12, wherein the second **resin** layer is a photosensitive **resin** layer; and the predetermined process is to bake the photosensitive **resin** layer at a predetermined baking temperature after irradiating a surface of the photosensitive **resin** layer with ultraviolet light.

Claims Text - CLTX (17):

16. A method of manufacturing a reflective liquid crystal display comprising: forming an organic **resin** film by applying an organic **resin** on to a substrate; baking the organic **resin** film; hardening only a surface layer of the organic **resin** film by applying charged particles to the same; forming wrinkle-like **recesses** and projections on a surface of the organic **resin** film by performing a thermal process on the same; and forming a reflective electrode on the organic **resin** film.

Claims Text - CLTX (18):

17. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein a positive photoresist is used as the organic **resin**.

Claims Text - CLTX (19):

18. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein the baking **step** is performed at a temperature in the range from 130 to 165.degree. C. at the baking **step**.

Claims Text - CLTX (21):

20. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein at least one kind of ions selected from among a group comprising H, He, B, P, Ar and As is applied to the organic **resin** film at the **step** of applying charged particles.

Claims Text - CLTX (22):

21. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein the charged particles are accelerated at an acceleration voltage in the range from 1 kV to 100 kV at the **step** of applying charged particles.

Claims Text - CLTX (23):

22. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein the dose of the charged particles is in the range from 1.times.10.sup.13 to 2.times.10.sup.15/cm.sup.2 at the **step** of applying charged particles.

Claims Text - CLTX (24):

23. A method of manufacturing a reflective liquid crystal display according to claim 16, wherein the charged particles are applied to the organic **resin** film using any of an ion doping process, a reactive ion plasma etching process, an electron cyclotron resonance plasma process, an ICP process, and a TCP process.

Claims Text - CLTX (25):

24. A method of manufacturing a reflective liquid crystal display, comprising the **steps** of: forming a **gate** bus line to which a scan signal is supplied, a data bus line to which a display signal is supplied, and a thin film **transistor** whose **gate** electrode is connected to the **gate** bus line and whose drain electrode is connected to the data bus line on a first substrate; forming an insulation film above the **gate** bus line, the data bus line, and the thin film **transistor**; forming a first photoresist film on the insulation film; performing first exposure and developing to form an opening in a position of

the first photoresist film associated with a **source** electrode of the thin film **transistor**; etching the insulation film using the first photoresist film as a mask to form a contact hole that leads to the **source** electrode of the thin film **transistor**; removing the first photoresist film; forming a second photoresist film on the insulation film; performing second exposure and developing to form an opening in a position of the second photoresist film associated with the contact hole; doping a surface layer of the second photoresist film with charged particles; forming wrinkle-like **recesses** and projections on a surface of the second photoresist film by performing a thermal process on the same; forming a **conductive** reflective film throughout a top entire surface of the second photoresist film; forming a first electrode by patterning the reflective film; arranging a second substrate having a second electrode comprising a **conductor** film provided thereon and the first substrate opposite to each other; and sealing a liquid crystal between the first and second substrates.

Claims Text - CLTX (26):

25. A method of manufacturing a reflective liquid crystal display, comprising the **steps** of: forming a **gate** bus line to which a scan signal is supplied, a data bus line to which a display signal is supplied, and a thin film **transistor** whose **gate** electrode is connected to the **gate** bus line and whose drain electrode is connected to the data bus line on a first substrate; forming an insulation film above the **gate** bus line, the data bus line, and the thin film **transistor**; forming a photoresist film on the insulation film; performing exposure and developing to form an opening in a position of the photoresist film associated with a **source** electrode of the thin film **transistor**; forming a contact hole that leads to the **source** electrode of the thin film **transistor** by etching the insulation film using the photoresist film as a mask; doping a surface layer of the photoresist film with charged particles; forming wrinkle-like **recesses** and projections on a surface of the photoresist film by performing a thermal process on the same; forming a **conductive** reflective film throughout a top entire surface of the photoresist film; forming a first electrode by patterning the reflective film; arranging a second substrate having a second electrode comprising a **conductor** film provided thereon and the first substrate opposite to each other; and sealing a liquid crystal between the first ans second substrates.

Claims Text - CLTX (27):

26. A reflective liquid crystal display comprising: a liquid crystal sealed between a pair of substrates; a **gate** bus line to which a scan signal is supplied, a data bus line to which a display signal is supplied, a thin film **transistor** whose **gate** electrode is connected to the **gate** bus line and whose

drain electrode is connected to the data bus line on either of the pair of substrates; an organic **resin** film formed above the **gate** bus line, the data bus line, and the thin film **transistor** and provided with wrinkle-like **recesses** and projections on a surface thereof, wherein the **recesses** and projections of the organic **resin** film being formed by performing a thermal process after doping a surface layer thereof with charged particles; and a reflective electrode formed on the organic **resin** film and provided with **recesses** and projections that follow the **recesses** and projections of the organic **resin** film.

Claims Text - CLTX (28):
27. A reflective liquid crystal display according to claim 26, wherein the thin film **transistor** is a channel-protection type thin film **transistor**.

Claims Text - CLTX (29):
28. A reflective liquid crystal display according to claim 26, wherein the thin film **transistor** is a channel-etched type thin film **transistor**.

Claims Text - CLTX (30):
29. A reflective liquid crystal display according to claim 26, comprising a pattern for regulating the extending direction of the wrinkle-like **recesses** and projections that is formed in the same layer as that of the **gate** electrode under the reflective electrode.